

LISTING OF CLAIMS

1. (Currently Amended) A method comprising:

synchronizing a data volume of a first node, a data volume of a second node, a data volume of a third node, and a data volume of a fourth node;
asynchronously, but-not-periodically, replicating data to be written to [[a]] said data volume of [[a]] said first node to [[a]] said data volume of [[a]] said second node from said first node; and
writing said data to said data volume of said first node, wherein
said writing is performed after or in parallel with said replicating said data
to said data volume of said second node;
replicating said data to be-written-to said data volume of said second node to a said data volume of [[a]] said third node, wherein
said replicating said data to be-written-to said data volume of said second node
comprises-periodically-replicating, said data volume of said third node
is performed using periodic replication at a first frequency, said data to be-written-to said data volume of said second node from said second node to said data volume of said third node; and
replicating said data to be-written-to said data volume of said third node to a said data volume of [[a]] said fourth node, wherein
said replicating said data to be-written-to said data volume of said third node
comprises-periodically-replicating, said data volume of said fourth node
is performed using periodic replication at a second frequency, said data to be-written-to said data volume of said third node from said second node to said data volume of said fourth node; wherein
said first frequency is higher different than said second frequency.

2. (Cancelled)

3. (Currently Amended) A method comprising:

synchronizing a data volume of a first node, a data volume of a second node, a data volume of a third node, a data volume of a fourth node, and a data volume of a fifth node;

asynchronously, but not periodically, replicating data to be written to [[a]] said data volume of [[a]] said first node to [[a]] said data volume of [[a]] said second node from said first node; and

writing said data to said data volume of said first node, wherein
said writing is performed after or in parallel with said replicating said data
to said data volume of said second node;

replicating said data to be-written-to said data volume of said second node to a said data volume of [[a]] said third node, wherein
said replicating said data to be-written-to said data volume of said second node
comprises asynchronously replicating said data to be written to said
data volume of said second node said data volume of said third node is
performed using asynchronous replication from said second node to
said data volume of said third node; and

replicating said data to be-written-to said data volume of said third node to a said data volume of [[a]] said fourth node, wherein
said replicating said data to be-written-to said data volume of said third node
comprises periodically replicating, said data volume of said fourth
node is performed using periodic replication at a first frequency, said
data to be written to said data volume of said third node from said
third node to said data volume of said fourth node; and

replicating said data to be-written-to said data volume of said fourth node to a said data volume of [[a]] said fifth node, wherein
said replicating said data to be-written-to said data volume of said fourth node
comprises periodically replicating, said data volume of said fifth node
is performed using periodic replication at a second frequency, said data
to be written to said data volume of said fourth node from said fourth
node to said data volume of said fifth node, wherein

said first frequency is higher different than said second frequency.

4. (Cancelled)

5. (Currently Amended) The method of claim 3, wherein, ~~said asynchronously, but not periodically, replicating data to be written to said data volume of said first node comprises, asynchronously replicating data to be written to a data volume of a primary node to a data volume of an intermediate node; and~~ ~~said asynchronously replicating data to be written to said data volume of said second node comprises, asynchronously replicating data to be written to said data volume of said intermediate node to a data volume of a secondary node~~ said first node is a primary node, said second node is an intermediate node, and said third node is a secondary node.

6. (Currently Amended) The method of claim 5, ~~wherein said asynchronously replicating data to be written to said data volume of said intermediate node comprises asynchronously replicating data to be written to said data volume of said intermediate node to a data volume of each of a plurality of secondary nodes further comprising:~~ replicating said data to a plurality of secondary nodes from said intermediate node.

7. (Currently Amended) The method of claim 3, wherein, ~~said asynchronously, but not periodically, replicating said data to be written to said data volume of said first second node comprises asynchronously replicating said data to be written to said data volume of said first node to said data volume of said second node using a first data link coupled between said first node and said second node;~~ ~~said asynchronously replicating said data to be written to said data volume of said second third node comprises asynchronously replicating said data to be written to said data volume of said second node to said data volume of said third node using a second data link coupled between said second node and said third node;~~ and

said first data link has a higher different bandwidth than said second data link.

8. (Currently Amended) An apparatus comprising:

one or more first devices for synchronizing a data volume of a first node, a data volume of a second node, a data volume of a third node, and a data volume of a fourth node;

a first second device for asynhechronously, but not periodically, replicating data to be written to [[a]] said data volume of [[a]] said first node to [[a]] said data volume of [[a]] said second node from said first node; and

a third device for writing said data to said data volume of said first node, wherein said third device is configured to perform said writing after said replicating said data to said data volume of said second node or is configured to perform said writing in parallel with said replicating said data to said data volume of said second node or both;

a second fourth device for replicating said data to be-written-to-said-data-volume-of-said-second-node-to-a said data volume of [[a]] said third node, wherein said replicating said data to be-written-to-said-data-volume-of-said-second-node comprises periodically replicating, said data volume of said third node is performed using periodic replication at a first frequency, said data to be-written-to-said-data-volume-of-said-second-node from said second node to said data volume of said third node; and

a third fifth device for replicating said data to be-written-to-said-data-volume-of-said-third-node-to-a said data volume of [[a]] said fourth node, wherein said replicating said data to be-written-to-said-data-volume-of-said-third-node comprises periodically replicating, said data volume of said fourth node is performed using periodic replication at a second frequency, said data to be-written-to-said-data-volume-of-said-third-node from said second node to said data volume of said fourth node, wherein said first frequency is higher different than said second frequency.

9. (Canceled)

10. (Currently Amended) An apparatus comprising:

one or more first devices for synchronizing a data volume of a first node, a data volume of a second node, a data volume of a third node, a data volume of a fourth node, and a data volume of a fifth node;

a first second device for asynchroneously, but not periodically, replicating data to be written to [[a]] said data volume of [[a]] said first node to [[a]] said data volume of [[a]] said second node from said first node; and

a third device for writing said data to said data volume of said first node, wherein said third device is configured to perform said writing after said replicating said data to said data volume of said second node or is configured to perform said writing in parallel with said replicating said data to said data volume of said second node or both;

a second fourth device for replicating said data to be-written-to-said-data-volume-of-said-second-node-to-a said data volume of [[a]] said third node, wherein said second fourth device for replicating data to be-written-to-said-data

volume-of-said-second-node comprises a device for asynchronously replicating said data from said second node to be-written-to-said-data-volume-of-said-second-node to said data volume of said third node; and

a third fifth device for replicating said data to be-written-to-said-data-volume-of-said-third-node-to-a said data volume of [[a]] said fourth node, wherein said third fifth device for replicating data to be-written-to-said-data-volume-of-said-third-node comprises a device for periodically replicating, at a first frequency, said data from said third node to be-written-to-said-data-volume-of-said-third-node to said data volume of said fourth node; and

a fourth sixth device for replicating said data to be-written-to-said-data-volume-of-said-fourth-node-to-a said data volume of [[a]] said fifth node, wherein said fourth sixth device for replicating data to be-written-to-said-data-volume-of-said-fourth-node comprises a device for periodically replicating, at a second frequency, said data from said fourth node to be-written-to-said

~~data-volume-of-said-fourth-node-to~~ said data volume of said fifth node,
wherein
said first frequency is ~~higher different~~ than said second frequency.

11. (Cancelled)

12. (Currently Amended) The apparatus of claim 10, wherein,
~~said first device for asynchronously, but not periodically, replicating data to be~~
~~written to said data volume of said first node comprises,~~
~~a device for asynchronously replicating data to be written to a data volume of~~
~~a primary node to a data volume of an intermediate node; and~~
~~said second device for asynchronously replicating data to be written to said data~~
~~volume of said second node comprises,~~
~~a device for asynchronously replicating data to be written to said data~~
~~volume of said intermediate node to a data volume of a secondary~~
~~node~~
said first node is a primary node, said second node is an intermediate node, and said
third node is a secondary node.

13. (Currently Amended) The apparatus of claim 12, wherein
~~said fourth device for asynchronously replicating data to be written to said data~~
~~volume of said intermediate node~~ comprises a device for asynchronously
replicating said data to be written to said data volume of said intermediate
node to a data volume of each of a plurality of secondary nodes from said
intermediate node.

14. (Currently Amended) The apparatus of claim 10, wherein,
said first second device ~~for asynchronously, but not periodically, replicating data to~~
~~be written to said data volume of said first node~~ comprises a device for
asynchronously replicating said data to ~~be written to said data volume of said~~
~~first node to~~ said data volume of said second node using a first data link coupled
between said first node and said second node;
said fourth device means for asynchronously replicating data to be written to said
data volume of said second node comprises a device for asynchronously
replicating said data to ~~be written to said data volume of said second node to~~
~~said data volume of said third node using a second data link coupled between said~~
~~second node and said third node; and~~
said first data link has a higher different bandwidth than said second data link.

15. (Currently Amended) A set of machine-readable mediums collectively having a plurality of instructions executable by two or more machines, wherein said plurality of instructions when executed cause said two or more machines to perform a method comprising:
synchronizing a data volume of a first node, a data volume of a second node, a data
volume of a third node, and a data volume of a fourth node;
asynchronously, but not periodically, replicating data to be written to [[a]] said data
volume of [[a]] said first node to [[a]] said data volume of [[a]] said second node
from said first node; and
writing said data to said data volume of said first node, wherein
said writing is performed after or in parallel with said replicating said data
to said data volume of said second node;
replicating said data to ~~be written to said data volume of said second node to a said~~
~~data volume of [[a]] said third node, wherein~~
said replicating said data to ~~be written to said data volume of said second node~~
~~comprises periodically replicating, said data volume of said third node~~
~~is performed using periodic replication~~ at a first frequency, said data to

be written to said data volume of said second node from said second node to said data volume of said third node; and
replicating said data to be written to said data volume of said third node to a said data volume of [[a]] said fourth node, wherein
said replicating said data to be written to said data volume of said third node comprises periodically replicating, said data volume of said fourth node is performed using periodic replication at a second frequency, said data to be written to said data volume of said third node to from said third node to said data volume of said fourth node; wherein
said first frequency is higher different than said second frequency.

16. (Cancelled)

17. (Currently Amended) A set of machine-readable mediums collectively having a plurality of instructions executable by two or more machines, wherein said plurality of instructions when executed cause said two or more machines to perform a method comprising:
synchronizing a data volume of a first node, a data volume of a second node, a data volume of a third node, a data volume of a fourth node, and a data volume of a fifth node;
asynchronously, but not periodically, replicating data to be written to [[a]] said data volume of [[a]] said first node to [[a]] said data volume of [[a]] said second node from said first node; and
writing said data to said data volume of said first node, wherein
said writing is performed after or in parallel with said replicating said data to said data volume of said second node;
replicating said data to be written to said data volume of said second node to a said data volume of [[a]] said third node, wherein
said replicating said data to be written to said data volume of said second node comprises asynchronously replicating said data to be written to said data volume of said second node said data volume of said third node is

performed using asynchronous replication from said second node to
said data volume of said third node; and
replicating said data to be-written-to-said-data-volume-of-said-third-node-to-a said data
volume of [[a]] said fourth node, wherein
said replicating said data to be-written-to-said-data-volume-of-said-third-node
comprises periodically replicating, said data volume of said fourth
node is performed using periodic replication at a first frequency, said
data-to-be-written-to-said-data-volume-of-said-third-node from said
third node to said data volume of said fourth node; and
replicating said data to be-written-to-said-data-volume-of-said-fourth-node-to-a said
data volume of [[a]] said fifth node, wherein
said replicating said data to be-written-to-said-data-volume-of-said-fourth-node
comprises periodically replicating, said data volume of said fifth node
is performed using periodic replication at a second frequency, said-data
to-be-written-to-said-data-volume-of-said-fourth-node from said fourth
node to said data volume of said fifth node, wherein
said first frequency is higher different than said second frequency.

18. (Cancelled)

19. (Currently Amended) The set of machine-readable mediums of claim 17,
wherein,
said-asynchronously, but not periodically, replicating data to be written-to-said-data
volume-of-said-first-node comprises,
replicating data to be written-to-a-data-volume-of-a-primary-node to a data
volume-of-an-intermediate-node; and
said-asynchroneously replicating data to be written-to-said-data-volume-of-said
second-node comprises,
asynchroneously replicating data to be written-to-said-data-volume-of-said
intermediate-node to a data-volume-of-a-secondary-node

said first node is a primary node, said second node is an intermediate node, and said third node is a secondary node.

20. (Currently Amended) The set of machine-readable mediums of claim 19, wherein ~~said asynchronously replicating data to be written to said data volume of said intermediate node comprises asynchronously replicating data to be written to said data volume of said intermediate node to a data volume of each of a plurality of secondary nodes said method further comprises replicating said data to a plurality of secondary nodes from said intermediate node.~~

21. (Currently Amended) The set of machine-readable mediums of claim 17, wherein,

 said ~~asynchronously, but not periodically~~, replicating said data to ~~be written to~~ said data volume of said first second node comprises ~~asynchronously~~ replicating said data ~~to be written to said data volume of said first node~~ to said data volume of said second node using a first data link coupled between said first node and said second node;

 said ~~asynchronously~~ replicating said data to ~~be written to~~ said data volume of said second third node comprises ~~asynchronously~~ replicating said data to ~~be written to said data volume of said second node~~ to said data volume of said third node using a second data link coupled between said second node and said third node; and

 said first data link has a ~~higher different~~ bandwidth than said second data link.

22. - 25 (Canceled)

26. (Canceled)

27. (New) The method of claim 1, further comprising intercepting a request to write said data, wherein
 said intercepting is performed after said synchronizing, and
 said request was sent by an application;

storing said data within a log of said first node, wherein
said storing is performed after or in parallel with said intercepting;
notifying said application that said request has been completed, wherein
said notifying is performed after or in parallel with said storing, and
said replicating said data to said data volume of said second node is performed
after or in parallel with said notifying.

28. (New) A method comprising:
synchronizing a data volume of a first node, a data volume of a second node, and a data
volume of a third node;
intercepting a request to write data to said data volume of said first node, wherein
said intercepting is performed after said synchronizing, and
said request was sent by an application;
storing said data within a log of said first node;
notifying said application that said request has been completed, wherein
said notifying is performed after or in parallel with said storing;
replicating said data to said data volume of said second node from said first node,
wherein
said replicating is performed after or in parallel with said notifying;
writing said data to said data volume of said first node;
replicating said data to said data volume of said third node from said second node,
wherein
said replicating said data to said data volume of said third is performed using
periodic replication at a first frequency from said second node to said data
volume of said third node.